

# ALGEBRA FX 2.0

## *User's Guide*

GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THE UNIT IN THE U.S.A. (not applicable to other areas).

## NOTICE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

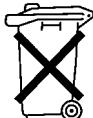
Proper connectors must be used for connection to host computer and/or peripherals in order to meet FCC emission limits.

Connector SB-62  
Connector FA-123

Power Graphic Unit to Power Graphic Unit  
Power Graphic Unit to PC for IBM/Macintosh Machine



Batterij niet weggooien,  
maar inleveren als  
KCA



CASIO ELECTRONICS CO., LTD.  
Unit 6, 1000 North Circular Road,  
London NW2 7JD, U.K.

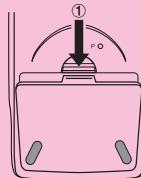
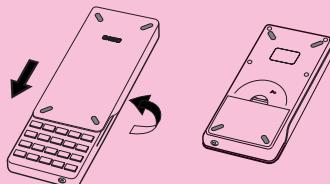
### Important!

Please keep your manual and all information handy for future reference.

# BEFORE USING THE CALCULATOR FOR THE FIRST TIME...

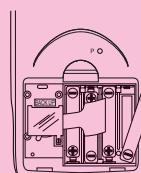
This calculator does not contain any main batteries when you purchase it. Be sure to perform the following procedure to load batteries, reset the calculator, and adjust the contrast before trying to use the calculator for the first time.

1. Making sure that you do not accidentally press the **AC/ON** key, slide the case onto the calculator and then turn the calculator over. Remove the back cover from the calculator by pulling with your finger at the point marked ①.

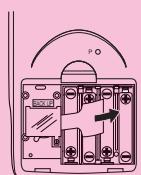


2. Load the four batteries that come with calculator.

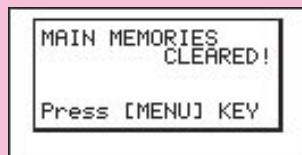
- Make sure that the positive (+) and negative (-) ends of the batteries are facing correctly.



3. Remove the insulating sheet at the location marked "BACK UP" by pulling in the direction indicated by the arrow.

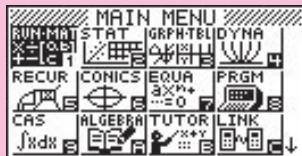
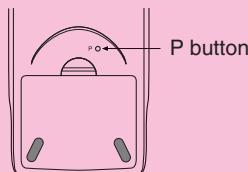


4. Replace the back cover, making sure that its tabs enter the holes marked ② and turn the calculator front side up. The calculator should automatically turn on power and perform the memory reset operation.

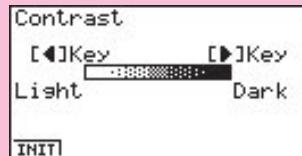


5. Press **[MENU]**.

- If the Main Menu shown to the right is not on the display, press the P button on the back of the calculator to perform memory reset.



6. Use the cursor keys ( $\blacktriangleleft$ ,  $\blacktriangleright$ ,  $\blacktriangledown$ ,  $\blacktriangleright$ ) to select the **SYSTEM** icon and press **[EXE]**, then press **[F2]** ( $\blacktriangleright$ ) to display the contrast adjustment screen.



7. Adjust the contrast.

- The  $\blacktriangleright$  cursor key makes display contrast darker.
- The  $\blacktriangleleft$  cursor key makes display contrast lighter.
- **[F1]** (INIT) returns display contrast to its initial default.

8. To exit display contrast adjustment, press **[MENU]**.

# Quick-Start

**Turning Power On And Off**

**Using Modes**

**Basic Calculations**

**Replay Feature**

**Fraction Calculations**

**Exponents**

**Graph Functions**

**Dual Graph**

**Box Zoom**

**Dynamic Graph**

**Table Function**

# Quick-Start

Welcome to the world of graphing calculators.

Quick-Start is not a complete tutorial, but it takes you through many of the most common functions, from turning the power on, and on to graphing complex equations. When you're done, you'll have mastered the basic operation of this calculator and will be ready to proceed with the rest of this user's guide to learn the entire spectrum of functions available.

Each step of the examples in Quick-Start is shown graphically to help you follow along quickly and easily. When you need to enter the number 57, for example, we've indicated it as follows:

Press **5** **7**

Whenever necessary, we've included samples of what your screen should look like. If you find that your screen doesn't match the sample, you can restart from the beginning by pressing the "All Clear" button **AC/ON**.

## TURNING POWER ON AND OFF

To turn power on, press **AC/ON**.

To turn power off, press **SHIFT** **AC/ON**.

OFF

Calculator power turns off automatically if you do not perform any operation within the Auto Power Off trigger time you specify. You can specify either six minutes or 60 minutes as the trigger time.

## USING MODES

This calculator makes it easy to perform a wide range of calculations by simply selecting the appropriate mode. Before getting into actual calculations and operation examples, let's take a look at how to navigate around the modes.

### To select the RUN·MAT Mode

1. Press **MENU** to display the Main Menu.



2. Use to highlight **RUN · MAT** and then press **EXE**.

This is the initial screen of the **RUN · MAT** Mode, where you can perform manual calculations, matrix calculations, and run programs.



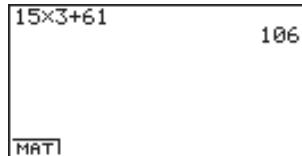
## BASIC CALCULATIONS

With manual calculations, you input formulas from left to right, just as they are written on paper. With formulas that include mixed arithmetic operators and parentheses, the calculator automatically applies true algebraic logic to calculate the result.

**Example:**  $15 \times 3 + 61$

1. Press **AC/ON** to clear the calculator.

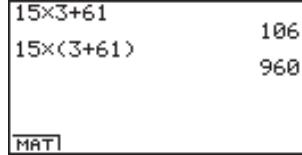
2. Press **1** **5** **×** **3** **+** **6** **1** **EXE**.



## Parentheses Calculations

**Example:**  $15 \times (3 + 61)$

1. Press **1** **5** **×** **(** **3** **+** **6** **1** **)** **EXE**.



## Built-In Functions

This calculator includes a number of built-in scientific functions, including trigonometric and logarithmic functions.

**Example:**  $25 \times \sin 45^\circ$

**Important!**

**Be sure that you specify Deg (degrees) as the angle unit before you try this example.**



## SET UP

1. Press **CTRL** **F3** to display the SET UP screen.

```

Mode :Comp
Func Type :Y=
Draw Type :Connect
Derivative :Off
Ansle :Rad
Complex Mode:Real
Coord :On
ComP DecI HexI BinI OctI

```

2. Press **▼** **▼** **▼** **▼** **F1** (Deg) to specify degrees as the angle unit.

**Mangle** :Deg

3. Press **ESC** to clear the menu.

4. Press **AC/ON** to clear the unit.

5. Press **2** **5** **X** **sin** **4** **5** **EXE**.

25×sin 45  
17.67766953  
MAT

## REPLAY FEATURE

With the replay feature, simply press **◀** or **▶** to recall the last calculation that was performed so you can make changes or re-execute it as it is.

**Example:** To change the calculation in the last example from  $(25 \times \sin 45^\circ)$  to  $(25 \times \sin 55^\circ)$

1. Press **◀** to display the last calculation.
2. Press **◀** twice to move the cursor ([]) to 4.
3. Press **DEL** to delete 4.
4. Press **5**.
5. Press **EXE** to execute the calculation again.



25×sin 55  
20.47880111  
MAT

# FRACTION CALCULATIONS

You can use the  key to input fractions into calculations. The symbol “ $\frac{\Box}{\Box}$ ” is used to separate the various parts of a fraction.

**Example:**  $1\frac{15}{16} + \frac{37}{9}$

1. Press **AC/ON**.

2. Press

Indicates 6 7/144

$$\begin{array}{r} 16+37,9 \\ 6,7,144 \\ \hline \end{array}$$

## Converting a Mixed Fraction to an Improper Fraction

While a mixed fraction is shown on the display, press **SHIFT abc** to convert it to an improper fraction.

Press **SHIFT**  again to convert back to a mixed fraction.

1,15,16+37,9 871,144

## Converting a Fraction to Its Decimal Equivalent

While a fraction is shown on the display, press  **$\frac{a}{b}$**  to convert it to its decimal equivalent.

Press  again to convert back to a fraction.

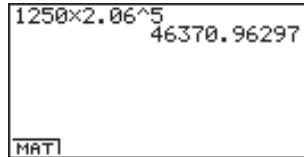
1.15.16+37,9  
6.048611111



## EXPONENTS

**Example:**  $1250 \times 2.06^5$

1. Press **AC/ON**.
2. Press **1** **2** **5** **0** **X** **2** **•** **0** **6**.
3. Press **^** and the **^** indicator appears on the display.
4. Press **5**. The **^5** on the display indicates that 5 is an exponent.
5. Press **EXE**.





## GRAPH FUNCTIONS

The graphing capabilities of this calculator makes it possible to draw complex graphs using either rectangular coordinates (horizontal axis:  $x$ ; vertical axis:  $y$ ) or polar coordinates (angle:  $\theta$ ; distance from origin:  $r$ ).

All of the following graphing examples are performed starting from the calculator setup in effect immediately following a reset operation.

### Example 1: To graph $Y = X(X + 1)(X - 2)$

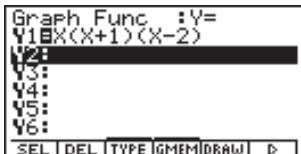
1. Press **MENU**.

2. Use to highlight **GRPH •TBL**, and then press **EXE**.

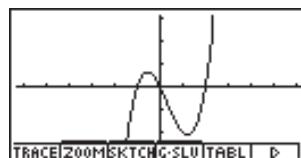


3. Input the formula.

**EXE**

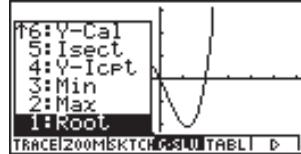


4. Press **F5** (DRAW) or **EXE** to draw the graph.



### Example 2: To determine the roots of $Y = X(X + 1)(X - 2)$

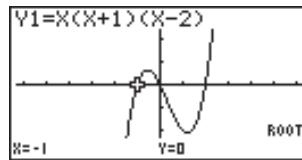
1. Press **F4** (G-SLV) to display the pull-up menu.





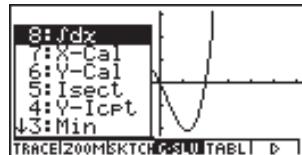
2. Press **1** (Root).

Press for other roots.

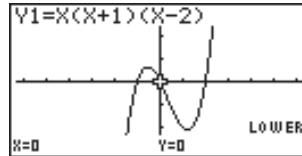


**Example 3:** Determine the area bounded by the origin and the  $X = -1$  root obtained for  $Y = X(X + 1)(X - 2)$

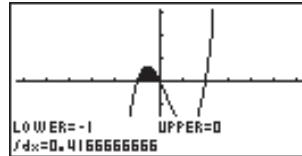
1. Press **ESC** **F4** (G-SLV) .



2. Press **8** ( $\int dx$ ).



3. Use to move the pointer to the location where  $X = -1$ , and then press **EXE**. Next, use to move the pointer to the location where  $X = 0$ , and then press **EXE** to input the integration range, which becomes shaded on the display.





## DUAL GRAPH

With this function you can split the display between two areas and display two graphs on the same screen.

**Example:** To draw the following two graphs and determine the points of intersection

$$Y1 = X(X + 1)(X - 2)$$

$$Y2 = X + 1.2$$

SET UP

1. Press **CTRL** **F3**    **F2** (G+G)  
to specify "G+G" for the Dual Screen setting.

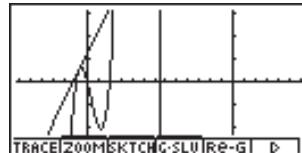
```
Variable :Range
Draw Type :Connect
Graph Func :On
Dual Screen :G+G
Simul Graph :Off
Derivative :Off
Background :None
T+G|G+G|GtoT|off|
```

2. Press **ESC**, and then input the two functions.

       
     **EXE**  
     **EXE**

```
Graph+Graph :Y=
Y1: X(X+1)(X-2)
Y2: X+1.2
Y3:
Y4:
Y5:
Y6:
SEL|DEL|TYPE|GMEM|DRAW| D
```

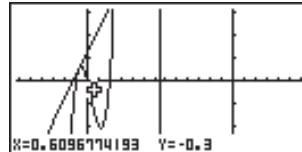
3. Press **F5** (DRAW) or **EXE** to draw the graphs.



## BOX ZOOM

Use the Box Zoom function to specify areas of a graph for enlargement.

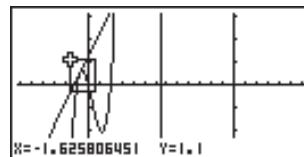
1. Press **F2** (ZOOM) **1** (Box).



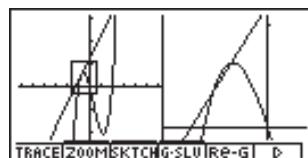
2. Use     to move the pointer to one corner of the area you want to specify and then press **EXE**.



3. Use to move the pointer again. As you do, a box appears on the display. Move the pointer so the box encloses the area you want to enlarge.



4. Press **EXE**, and the enlarged area appears in the inactive (right side) screen.



## DYNAMIC GRAPH

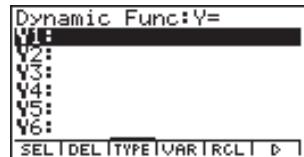
Dynamic Graph lets you see how the shape of a graph is affected as the value assigned to one of the coefficients of its function changes.

**Example:** To draw graphs as the value of coefficient A in the following function changes from 1 to 3

$$Y = AX^2$$

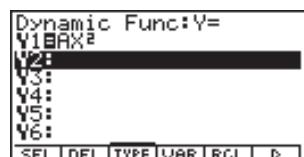
1. Press **MENU**.

2. Use to highlight **DYNA**, and then press **EXE**.



3. Input the formula.

**ALPHA** **A** **X,θ,T** **X,θ,T** **X<sup>2</sup>** **EXE**





4. Press **F4** (VAR) **1** **EXE** to assign an initial value of 1 to coefficient A.



V1=RX<sup>2</sup>  
Dynamic Var :A / ▶  
A=1  
SEL RANG SPEED DYNAL

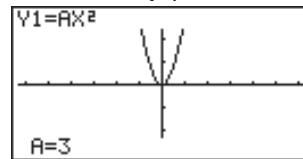
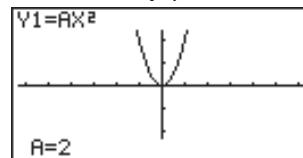
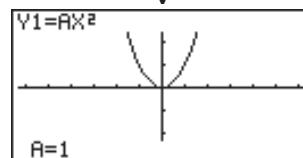
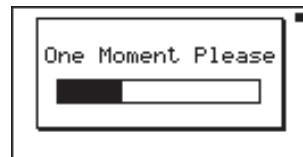
5. Press **F2** (RANG) **1** **EXE** **3** **EXE** **1** **EXE** to specify the range and increment of change in coefficient A.



V1=RX<sup>2</sup>  
Dynamic Range  
A  
Start:1  
End:3  
Pitch:1

6. Press **ESC**.

7. Press **F6** (DYN) to start Dynamic Graph drawing.  
The graphs are drawn 10 times.





## TABLE FUNCTION

The Table Function makes it possible to generate a table of solutions as different values are assigned to the variables of a function.

**Example:** To create a number table for the following function

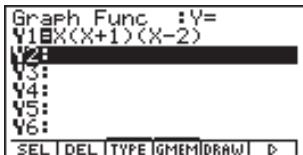
$$Y = X(X+1)(X-2)$$

1. Press **MENU**.

2. Use to highlight **GRPH ·TBL**, and then press **EXE**.



3. Input the formula.



4. Press **F6** ( $\rightarrow$ ) **F5** (TABL) to generate the number table.

x	y1
1	-2
2	0
3	12
4	40

1  
EDIT|DEL|ARE-TIG-CONG|PLT| D

To learn all about the many powerful features of this calculator, read on and explore!



# Handling Precautions

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- Your calculator is made up of precision components. Never try to take it apart.
- Avoid dropping your calculator and subjecting it to strong impact.
- Do not store the calculator or leave it in areas exposed to high temperatures or humidity, or large amounts of dust. When exposed to low temperatures, the calculator may require more time to display results and may even fail to operate. Correct operation will resume once the calculator is brought back to normal temperature.
- The display will go blank and keys will not operate during calculations. When you are operating the keyboard, be sure to watch the display to make sure that all your key operations are being performed correctly.
- Replace the main batteries once every 2 years regardless of how much the calculator is used during that period. Never leave dead batteries in the battery compartment. They can leak and damage the unit.
- Keep batteries out of the reach of small children. If swallowed, consult a physician immediately.
- Avoid using volatile liquids such as thinner or benzine to clean the unit. Wipe it with a soft, dry cloth, or with a cloth that has been moistened with a solution of water and a neutral detergent and wrung out.
- Always be gentle when wiping dust off the display to avoid scratching it.
- In no event will the manufacturer and its suppliers be liable to you or any other person for any damages, expenses, lost profits, lost savings or any other damages arising out of loss of data and/or formulas arising out of malfunction, repairs, or battery replacement. It is up to you to prepare physical records of data to protect against such data loss.
- Never dispose of batteries, the liquid crystal panel, or other components by burning them.
- When the “Low Main Batteries!” message or the “Low Backup battery!” message appears on the display, replace the main power supply batteries or the back up battery as soon as possible.
- Be sure that the power switch is set to OFF when replacing batteries.
- If the calculator is exposed to a strong electrostatic charge, its memory contents may be damaged or the keys may stop working. In such a case, perform the Reset operation to clear the memory and restore normal key operation.
- If the calculator stops operating correctly for some reason, use a thin, pointed object to press the P button on the back of the calculator. Note, however, that this clears all the data in calculator memory.
- Note that strong vibration or impact during program execution can cause execution to stop or can damage the calculator's memory contents.
- Using the calculator near a television or radio can cause interference with TV or radio reception.
- Before assuming malfunction of the unit, be sure to carefully reread this user's guide and ensure that the problem is not due to insufficient battery power, programming or operational errors.

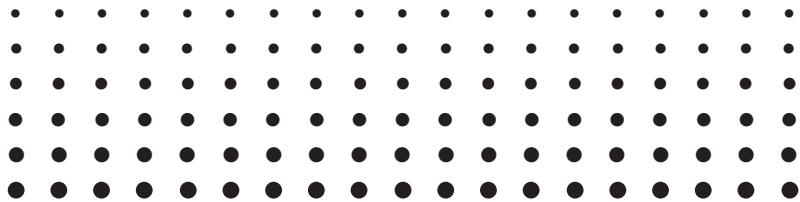


### ***Be sure to keep physical records of all important data!***

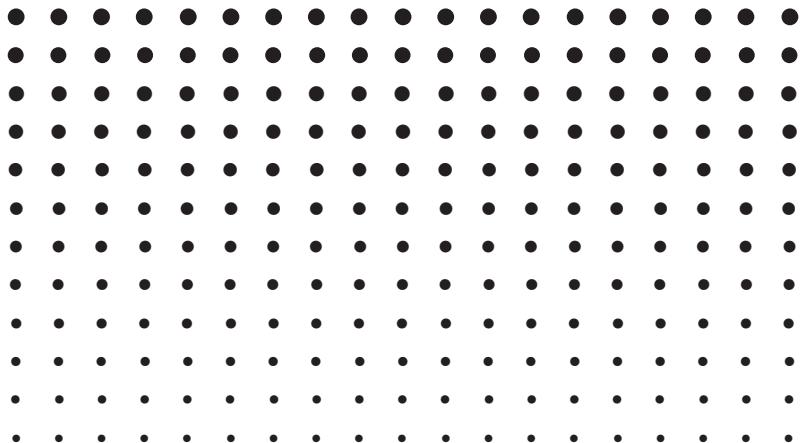
Low battery power or incorrect replacement of the batteries that power the unit can cause the data stored in memory to be corrupted or even lost entirely. Stored data can also be affected by strong electrostatic charge or strong impact. It is up to you to keep back up copies of data to protect against its loss.

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# *ALGEBRA FX 2.0*





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# Getting Acquainted

## — Read This First!

### About this User's Guide

- **SHIFT** **X<sup>2</sup>** ( $\sqrt{ }$ )

The above indicates you should press **SHIFT** and then **X<sup>2</sup>**, which will input a  $\sqrt{ }$  symbol. All multiple-key input operations are indicated like this. Key cap markings are shown, followed by the input character or command in parentheses.

#### • Function Keys and Menus

- Many of the operations performed by this calculator can be executed by pressing function keys **F1** through **F6**. The operation assigned to each function key changes according to the mode the calculator is in, and current operation assignments are indicated by function menus that appear at the bottom of the display.
- This user's guide shows the current operation assigned to a function key in parentheses following the key cap for that key. **F1** (Comp), for example, indicates that pressing **F1** selects {Comp}, which is also indicated in the function menu.
- When ( $\triangleright$ ) is indicated in the function menu for key **F6**, it means that pressing **F6** displays the next page or previous page of menu options.

#### • Menu Titles

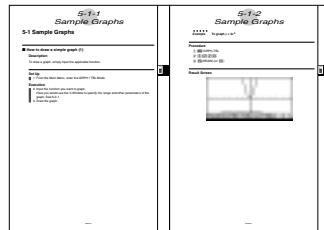
- Menu titles in this user's guide include the key operation required to display the menu being explained. The key operation for a menu that is displayed by pressing **OPTN** and then {MAT} would be shown as: **[OPTN]-[MAT]**.
- **F6** ( $\triangleright$ ) key operations to change to another menu page are not shown in menu title key operations.



## •Graphs

As a general rule, graph operations are shown on facing pages, with actual graph examples on the right hand page. You can produce the same graph on your calculator by performing the steps under the Procedure above the graph.

Look for the type of graph you want on the right hand page, and then go to the page indicated for that graph. The steps under "Procedure" always use initial RESET settings.



The step numbers in the "SET UP" and "Execution" sections on the left hand page correspond to the "Procedure" step numbers on the right hand page.

Example:

Left hand page

3. Draw the graph.

Right hand page

③ **F5** (DRAW)(or **EX**)

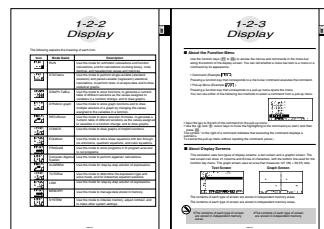
## •Command List

The Program Mode Command List (page 8-7) provides a graphic flowchart of the various function key menus and shows how to maneuver to the menu of commands you need.

Example: The following operation displays Xfct: [**VARS**]-[**FACT**]-[**Xfct**]

## •Page Contents

Three-part page numbers are centered at the top of each page. The page number "1-2-3", for example, indicates Chapter 1, Section 2, page 3.



## •Supplementary Information

Supplementary information is shown at the bottom of each page in a " (Notes)" block.

\* indicates a note about a term that appears in the same page as the note.

# indicates a note that provides general information about topic covered in the same section as the note.